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Recommended Citation

Raja Mohd Ali, Raja Haslinda; Tretiakov, Alexei; and Crump, Barbara, "Models of National Culture in Information Systems Research" (2009). *ACIS 2009 Proceedings*. 80.

<http://aisel.aisnet.org/acis2009/80>

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Models of National Culture in Information Systems Research

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Abstract

The purpose of this paper is to enhance understanding of how the models of national culture have been used in Information Systems research. Using the top 10 ranking journals, as defined by the Association of Information Systems, we review and categorise 60 papers published over the past 15 years. The essential criterion for selection was that they applied different models of national culture. The findings show that the number of national culture models used in IS research has increased over the years and most of these studies were conducted using a survey. As expected, Hofstede's dimensions of national culture have been used widely in IS research. It has also been found that models of national culture have been used for various purposes, namely management information systems, communication, knowledge management, project management, IT infrastructure, quality management systems, risk management, leadership, supply chain management and technology acceptance model. We note that in this era of globalisation the increased use of national culture to frame IS research is necessary to understand why IS initiatives may be successful in one country but not realised in another.

Keywords

National culture, Models of national culture, Information systems, Information systems research

INTRODUCTION

Researcher and practitioner interest in conducting IS studies involving national culture has grown in the last decade as is evident in the increased number of papers published in information systems journals over recent years. One can attribute this interest to the globalization phenomenon that took hold in the nineties (Bourdeaux, 2007) and led to an increased focus on cross-cultural agendas in essentially all areas of business and management research. While some of these papers reported empirical studies that have been conducted in numerous areas in information systems, namely management information systems, strategic planning, communication, knowledge management, project management, IT infrastructure, quality management, risk management, leadership, supply chain management and technology acceptance model, others are conceptual papers which present the authors' views and suggestions. Realizing the importance of integrating national culture in information systems, this paper aims to enhance the understanding of how the models of national culture have been used in Information Systems research.

This paper will be organized as follows. The second section will introduce the scholars of national culture, namely Hofstede (1980), Hall and Hall (1990), Trompenaars (1996), Schwartz (1999) and House, Mansour and Peter (2001). It will also present the main focus and dimensions developed by each scholar. The following section will discuss the importance of integrating national culture and IS research which has been noted by many researchers. Next, the methodology will be explained and the findings discussed. This paper reviewed all the articles (60 in totals) that related to IS and national culture from the top 10 journals ranked by the Association of Information Systems from 1990 to 2008. The findings are based on the analysis criteria of the number of IS research papers using national culture by time, research type, choice of national culture models and purpose of national culture in IS research. This paper will conclude with a discussion of the findings.

NATIONAL CULTURE

Models of national culture have been developed by many scholars. However Hofstede (1980) developed a model that is the most widely used in information systems research. He defined national culture as a collective programming of mind that distinguished one group from another. He identified five dimensions of culture, namely power distance, uncertainty avoidance, collectivism vs. individualism, masculinity vs. femininity and long-term orientation. Other concepts of culture that have been used in the information systems area were developed by Hall and Hall (1990), who viewed culture in terms of communication to distinguish one society from another, Trompenaars (1996) who viewed culture as shared assumptions and beliefs, values and norms, and action and language patterns that distinguish one group from another, Shalom Schwartz (1999) who distinguished one society from another in terms of what the important principles are that guide people to reach their goals and House et al. (2001) which focused on management and leadership. The details of each model are discussed below.

Hofstede's model

Hofstede's model differs from the alternatives (discussed later in this review) by not establishing a focus a priori – it is based on a large scale quantitative inductive empirical study. He developed his cultural dimensions by conducting a survey study with more than 117,000 IBM employees in 40 nations. Based on this study he identified four dimensions of culture, which are power distance, uncertainty avoidance, collectivism vs. individualism and masculinity vs. femininity. Later, he added another dimension, called long-term orientation, while conducting an international study with Chinese employees and managers (Hofstede and Bond 1988). Power distance refers to the inequality of distribution of power among members in society in terms of this being high or low. Uncertainty avoidance refers to the extent to which members of a society prefer to maintain their status and dislike any future uncertainty. Collectivism vs. individualism refers to the extent to which a society in a particular country sees itself as individualist as opposed to one which is community or group centred. Masculinity refers to the extent to which the members of a society prefer masculine values such as achievement, assertiveness and heroism as opposed to a feminine society which is more caring and values the quality of life. Finally, long-term orientation refers to the extent to which a society emphasises the future rather than the past or present. Whilst acknowledging that there are criticisms of Hofstede's model, such as its derivation from old data, lack of generalisability and over-simplification of culture (Ng, Lee and Soutar, 2007), Hofstede's model has been used widely in cross-cultural study and his dimensions have been adopted by various studies.

Hall and Hall's model

The concept of culture by Hall and Hall (1990) characterizes culture in terms of communication. They distinguished one culture from another in terms of communication. They believed that the world of communication can be separated into three parts which are words, material things and behaviour. By understanding these three parts of the communication process, it provides an insight into the underlying principles that shape our lives. They developed other dimensions of culture which include high vs. low context communication, monochronic vs. polychronic time, space and speed. High vs. low context communication refers to the way information is transmitted. In high communication context cultures, communication occurs through explicit statements in text and speech, while in low communication context cultures other communication cues, such as body language and silence, are emphasized. Monochronic vs. polychronic time orientation refers to how the society deals with time. Monochronic time describes those societies that prefer to accomplish tasks sequentially and to adhere to schedules, whereas polychronic time cultures are characterized by a tendency to engage in several activities occurring at the same time and lack of regard for schedules. Another dimension is space, which refers to an individual's attitude to their own personal space and territory. In a high territorial society, members will protect their ownership and in low territorial society members will share their ownership. The last dimension is speed, which refers to the speed with which messages are transmitted within a society, this being either fast or slow. A fast message is one which is easily decoded and acted on, whilst a slow message requires more effort. This model has been used mostly by studies that involved communication.

Trompenaars' model

The model by Trompenaars focuses on the differences in how different cultures address problem solving. Trompenaars (1996) views culture as composed of shared assumptions and beliefs, values and norms, and action and language patterns that distinguish one group from another. His study, which focused on minimising conflict between cultures in business organizations, has identified seven dimensions of culture, which are universalism vs. particularism, individualism vs. collectivism, specific vs. diffuse, neutrality vs. affectivity, achieved vs. ascribed, inner vs. outer directed and sequential vs. synchronic. The first five of these are defined in terms of

how people relate to each other, whilst the other two are defined in terms of how they relate to nature and management of time.

The first dimension, universalism vs. particularism, refers to the extent to which members of a society look at the rules or relationships. Individualism vs. collectivism refers to the inner conflict between what the members of a society want as individuals and what is in the best interests of the group. Specific vs. diffuse refers to whether or to what degree the members of a society involve others in specific areas of their lives as opposed to diffuse, multiple areas. Neutrality vs. affectivity refers to the extent to which members in a society act neutrally or express their emotions. Achieved vs. ascribed refers to the extent to which members relate status to achievement or socially assigned position. Inner vs. outer directed refers to the extent to which a member's behaviour is controlled by themselves or others. Lastly, sequential vs. synchronic refers to the degree to which people like to perform tasks one after another as opposed to doing all tasks at one time.

Even though there are some dimensions that appear to be similar to those of Hofstede, they apply to different perspectives. For example, Trompenaars' orientation value on individualism vs. collectivism differs from Hofstede's dimensions in the sense that Trompenaars believes that all individuals in society have an internal conflict between what they want individually and what is best for the group. By contrast, Hofstede views individualism vs. collectivism as the placement of emphasis on individual goals as opposed to group goals and vice versa. Trompenaars' dimensions have been used as an alternative to Hofstede's model (as in Melton, 2008) or in combination with Hofstede's model, (as in Wareham et. al, 2007), who combined the dimensions to analyse the different communication modes that characterize the process in technology centric off shoring relationships.

Schwartz's model

The model by Shalom Schwartz (1999) focuses on values guiding the behaviour in different cultures. Schwartz suggests that cultural values are the bases for the specific norms that tell people what is appropriate in various situations. Schwartz's value dimensions were derived from a set of items that measure the content of individual values recognized across cultures. He developed seven dimensions of culture theoretically: mastery of the social environment, harmony of the social environment, conservatism, intellectual autonomy, affective autonomy, hierarchy and egalitarianism. Mastery of the social environment is where individuals focus on actively mastering and changing the world and getting ahead through active self assertion. In contrast, harmony of the social environment relates to accepting the world as it is and trying to preserve it rather than change it. Conservatism refers to cultures in which the person is looked upon as an entity that is embedded in the collective. Autonomy, on the other hand, refers to how the members in the society express their own internal attributes. Schwartz identified two types of autonomy, namely intellectual and affective autonomy. Intellectual autonomy refers to ideas and thoughts, the right of individuals to follow their own intellectual direction, whilst affective autonomy refers to feelings and emotions, the right of individuals to pursue their own affectively positive experiences. Lastly, hierarchy vs. egalitarianism refers to the extent of inequalities in societies. The hierarchical society emphasizes the chain of authority, whilst the egalitarian society is one where individuals see themselves more as equals. His seven dimensions were tested on 87 teachers and students from 41 cultural groups in 38 nations between 1988 and 1992. He argued that his model offers several potential advantages to that of Hofstede in terms of it being theoretically derived, tested with more recent data and a more diverse (Ng et. al, 2007).

House et al.'s model

More recently, another model of national culture was developed by House et al. (2001) that focused on management and leadership. This model provides the closest replication of Hofstede's study (Tang and Koveos 2008), with most of the constructs used being originally from Hofstede's study. Apart from this similarity, there are differences in terms of the focus of the study and the type of respondents. Hofstede's study looked at IBM employees' values at work, whereas House et al. focused on leadership in society. In this project, they conducted a survey of management teams from 43 countries and identified nine cultural dimensions relevant to leadership, which are uncertainty avoidance, power distance, collectivism I (societal collectivism), collectivism II (In-group collectivism), gender egalitarianism, assertiveness, future orientation, performance orientation and human orientation. All these dimensions were derived from the work of previous scholars.

Dimensions of national culture

The dimensions identified by each scholar are summarized in Table 1 below. The model by Hall and Hall (1990) stands out by not sharing any dimensions with Hofstede's model. The rest of the models that appeared after the Hofstede's model either explicitly share dimensions with the Hofstede model and use the same items to measure them (as "Uncertainty avoidance" in House, 2001), use dimensions named the same as in Hofstede's model but use different items to measure them (such as Individualism / Collectivism in case of Trompenaars, 1996), or

include dimensions that are conceptually similar to dimensions in the Hofstede's model (such as Hierarchy / Egalitarianism in Schwartz, 1999 versus Hofstede's "Power distance").

Table 1. Dimensions of culture

Scholars	Focus	Dimensions
Hofstede (1980)	Work values at work	Power distance, Uncertainty avoidance, Collectivism vs. Individualism, Masculinity vs. Femininity, Long-term Orientation
Hall and Hall (1990)	Communication	High vs. Low-context communication, Monochronic vs. Polychronic time, Space, Speed
Trompenaars (1996)	Understanding cultural diversity in business	Universalism vs. Particularism, Individualism vs. Collectivism, Specific vs. Diffuse, Neutrality vs. Affectivity, Achieved vs. Ascribed, Inner vs. Outer directed, Sequential vs. Synchronic
Schwartz (1999)	The important values in one's life	Mastery environment, Harmony environment, Conservatism, Intellectual autonomy, Affective autonomy, Hierarchy and Egalitarianism
House et. al. (2001)	Type of leadership	Power distance, Uncertainty avoidance, Humane Orientation Collectivism I, Collectivism II, Assertiveness, Gender Egalitarianism, Future Orientation, Performance Orientation

METHODOLOGY

We started our research by reviewing previous research on IS from 1990 to 2008 and identifying 60 publications involving IS and national culture. We covered the top ten journal publications as ranked by the Association of Information Systems (AIS). These publications were MIS Quarterly, Communications of the ACM, Information Systems Research, Management Science, Journal of Management Information Systems, Harvard Business Review, Decision Sciences, Decision Support Systems, ACM Transactions in Information Systems and IEEE Transactions. We studied each of the research papers to review how the author(s) used national culture in their study or studies. Tables were developed that assigned the number of papers to the four categories of Time, Research type, Choice of model and Area in IS field. These are discussed in the following section.

FINDINGS

We present our findings based on models of national culture that relate to the categories of:

- (a) Time: from the period 1990 and 2008
- (b) Research type
- (c) Choice of model of culture
- (d) Area in IS field

It should be noted that no papers (for the period 1990-2008) were found in two journals, namely Journal of Management Information Systems and ACM Transactions in Information Systems. Therefore, these journals will not be shown in the tables.

Time: From 1990 to 2008

This section will explain the results for the total numbers of IS papers that actually used the models of national culture from 1990 to 2008 in 2-yearly periods. The results for this section are presented in Table 2 below.

It can be seen from Table 2 that the total number of papers that used models of national culture has increased each 2-yearly period, except for the period between 1996 and 1998. The first period, which is between 1990 and 1992, shows only one paper published, followed by ten papers in the second period. In the third period which is from 1996 until 1998, the numbers decreased to seven papers before rising to eleven during the next period. In

later periods these numbers keep increasing, rising to fifteen during 2002 to 2004, and sixteen in the last period which is from 2005 until 2008.

The increments in the numbers of papers suggest that researchers have realized the significance of considering national culture in IS research, especially in the present era of globalization. Since many organizations have started to embrace internationalization, it is important for them to identify and study the cultures that are different from theirs.

Table 2. Total number of papers that use models of national culture from each journal

Journal	1990-1992	1993-1995	1996-1998	1999-2001	2002-2004	2005-2008	Total
IEEE Transactions	0	1	2	6	6	7	22
Decision Sciences	0	3	0	1	2	2	8
Decision Support Systems	0	2	0	0	3	3	8
MIS Quarterly	0	0	1	2	1	3	7
Management Science	0	2	4	0	0	0	6
Communications of the ACM	1	1	0	1	2	0	5
Harvard Business Review	0	0	0	0	1	1	2
Information Systems Research	0	1	0	1	0	0	2
Total	1	10	7	11	15	16	60

Research type

This section will discuss the findings which show the numbers of papers that used models of national culture according to research type. The research type has been organized into six categories, which are survey, case study, conceptual paper, experiment, simulation and mixed method. It should be noted that all papers which fall under the category of conceptual paper are papers that have been written based on the author's opinion, relying as they do on suggestion and lacking research findings. The results of this section are shown in Table 3 below.

Table 3. Total number of IS papers that used models of national culture according to research type

Research Type	1990-1992	1993-1995	1996-1998	1999-2001	2002-2004	2005-2008	Total
Survey	1	5	4	6	8	7	31
Case study	0	1	2	1	2	4	10
Conceptual paper	0	0	0	1	4	3	8
Experiment	0	1	1	1	3	1	7
Simulation	0	1	0	1	0	0	2
Mixed method	0	2	0	0	0	0	2

Survey research was found to be the most popular type, with 31 of the total of 60 studied papers using the survey method for the data collection. These papers used the data either from one country studied or various countries. There was one paper published in the first period and this increased to five in the second period. The number dropped to four papers in the third period before rising again to six in the next period. Later, the number of papers increased significantly to eight in the fifth period and decreased to seven in the final period.

The second most popular method of data collection was through case study, with ten papers employing this method. Even though this type of data collection was not common in the research papers examined before the year 2000, numbers increased to two papers in the period 2002 to 2004 and four papers during 2005 to 2008. These increments show that researchers started to develop an interest in conducting case studies for this topic. In addition, eight conceptual papers on IS issues involving models of national culture were published between 1999 and 2008. This number increased steadily from one paper at the end of 1990s to four papers in the fourth period. In the last period, it fell to three.

The experiment type of data collection which includes papers that used laboratory and scenario experiment was conducted seven times while simulation study has been used twice. Further, there were two papers that used a mixed-method approach involving quantitative and qualitative methods of data collection. These results show that IS research involving models of national culture has been dominated by the survey method. This might be due to the large samples involved in most of these papers. Other popular types are case study and conceptual paper, while mixed-method is the least used. Even though the conceptual papers did not report any findings, the rising numbers of these papers since 1999 show that this issue is of interest not only to the researcher but also to practitioners.

Choice of model of culture

This category identifies the national culture models used by the researchers for each paper studied, namely, those of Hofstede (1980), Hall and Hall (1990), Trompenaars (1996), Schwartz (1994) and House et al. (2001). The findings for the total number of papers that used models of national culture according to the identified models of culture are presented in table 4 below.

Table 4. Total number of IS papers that used models of national culture according to models of culture

Models Used	1990-1992	1993-1995	1996-1998	1999-2001	2002-2004	2005-2008	Total
Hofstede	1	9	7	11	13	12	53
Trompenaars	0	1	1	1	3	3	9
Hall and Hall	0	1	0	4	1	2	8
House et. al.	0	0	0	0	0	4	4
Schwartz	0	0	0	0	2	0	2

Note: individual totals do not add up to the overall total of 60 papers studied because any single study may employ more than one model.

Hofstede's model dominated the field, and we did not discover any trends that would indicate that it is likely to lose its dominant position in the near future. Out of 60 papers studied, 53 have used Hofstede's culture model in their study, while nine papers used Trompenaars', and Hall and Hall's and House et al.'s models were used by eight and four studies respectively. Only two papers have used the Schwartz model in eight journals reviewed. It should be noted that out of the 53 papers that used Hofstede's model, 13 are the product of combination with the other culture models described in this paper. In addition, both papers that used Schwartz's model, seven of the papers which used Trompenaars' model, five of the papers which used Hall and Hall's model and two of those that used House et. al's model also used Hofstede's model.

The increase over the years in papers using Hofstede's model shows that his five dimensions of culture are the most popular and significant in IS research studies. The salient dimensions of culture are power distance, uncertainty avoidance, individualism vs. collectivism, masculinity vs. femininity and long-term orientation. In addition, unlike the alternative models, Hofstede's model has been found in all eight journals we reviewed. Schwartz's model of culture has been found to be the least used. This may be due to the focus of Schwartz's model of culture which studies important values that guide one's life, which has perhaps not been seen as immediately applicable to the IS area.

Area in IS field

Table 5 below provides useful information on how national culture has been used in IS research. Based on our findings, the purpose of national culture used in the studied journals varies.

Table 5. Total number of IS papers that used models of national culture according to area in IS field

Purpose of national culture models	1990-1992	1993-1995	1996-1998	1999-2001	2002-2004	2005-2008	Total
Communication	0	1	2	3	3	3	12
IT Infrastructure	0	0	0	1	3	1	5
Project management	0	1	0	1	2	1	5

Knowledge management	0	0	0	0	1	3	4
Quality Management Systems	0	2	0	0	1	0	3
Risk management	0	0	1	1	0	1	3
Leadership	0	0	0	0	1	2	3
Supply Chain Management	0	0	0	0	0	2	2
Technology Acceptance	0	1	0	0	0	1	2
Others	1	5	4	4	5	2	21

Our findings show that models of national culture have been used in IS research in various contexts, namely communication, knowledge management, project management, IT infrastructure, quality management systems, risk management, leadership, supply chain management and technology acceptance, and other management information systems issues (such as decision support systems, executive information systems and others). National culture has been used mostly in other issues in management information systems and communication, with totals of 21 and 12 respectively. Five papers were found to be in the IT infrastructure area and project management. A total of 4 papers have used national culture in the category of knowledge management. Quality management systems, risk management and leadership each have 3 papers while supply chain management and technology acceptance have two papers each. The details of each usage are discussed below.

Communication

National culture models have been used predominantly to study issues in communication. The table above shows that the number increased from one paper in the second period to two papers in the third. Later, it increased to three papers for the next three periods. Based on our study, many papers reported that national culture dimensions have been used mostly to investigate the differences in communication modes and communication styles. Even though most of these papers adopted Hofstede's dimensions, there is one paper which adopted Hall and Hall, two papers adopted Trompenaars, and four papers used a combination of models. These papers compare the results in two populations which are mainly from individualistic and collectivistic cultures. As an example, a matching laboratory experiment study led by Tan, Wei, Watson, Clapper and McLean (1998) investigated the impact of computer-mediated communication (CMC) on majority influence in two countries with different cultures, the US (an individualist culture) and Singapore (a collectivist culture). Their laboratory experiment study shows that the impact of CMC on majority influence depends on the national culture. Earlier, in 1996, Stock, Greis and Dibner investigated parent-subsidiary technical communication in multinational corporations where European and Japanese subsidiaries were examined. Their multi-method study revealed that the European-owned site spread communication through many different organizational levels using the web as compared to Japanese-owned sites. Our study also revealed that the methods used for data collection in communication usage category are varied and include survey, observation, experiment, simulation, interviews and case study.

IT Infrastructure

Five papers that involve national culture and the development of software, technology and infrastructure fall under this category. Four of these papers adopted Hofstede's model while the other paper adopted Hall and Hall's monochronism dimension. Two of these papers conducted a survey study and one paper conducted a case study and an experiment. A survey study conducted by Png, Tan and Wee (2001) explored the impact of uncertainty avoidance and power distance on the adoption of type of infrastructure which involved 153 businesses from 24 countries. Their study revealed that uncertainty avoidance countries were less likely to adopt frame relay (a type of IT infrastructure), while power distance was not significantly correlated with adoption of frame relay. Later, in 2002, Lynn conducted a literature study that investigated the relationship between culture differences and use of technology and IS development in Japan and the US. The trend shows that this topic became significant only in the late 1990s and early 2000s where only one paper is found in the period 1999 to 2001 and there is an increase to three in the 2002 to 2004 period.

Project Management

Papers that fall under this category are those which involve issues in project management, which include the cost of development, implementation of new programs and the development teams. While all five papers adopted Hofstede's dimensions, they used case study, experiment, multi-method or survey for data collection. For example, a survey study conducted by Kankanhalli, Tan, Wei and Holmes (2004) investigated the relationship between two cultural dimensions namely individualism-collectivism and masculinity-femininity and three development values (technical, economic and socio-political) of IS developers in Singapore and the US. Using

Partial Least Square, this study indicated that both cultural dimensions are related to the three development values. Papers published on integration between national cultures and information systems research started in 1995. There are no papers found after that until one paper appear in the period 1999 to 2001 and two appear in the period 2002 to 2004. Then, only one paper is found for the last period.

Knowledge Management

There are four papers where national culture has been used in relation to knowledge management, starting in 2002. The increment from one paper in the fifth period to three papers in the last period shows that this issue has become more significant. Our finding shows that all four papers in this area used survey as the method of data collection. This might be due to the large sample. Sarker, Sarker, Nicholson and Joshi (2005) conducted a study on knowledge transfer in virtual systems development teams which involved student members from a large US university and a large Norwegian university. Having culture as one of the factors of knowledge transfer, their study revealed that culture has been found to be significant in predicting the extent of knowledge transfer. Also in the same year, Bock, Zmud, Kim and Lee (2005) used culture to explain the limitations of their study in developing an understanding of the factors supporting individuals' knowledge sharing intentions. Their study involved 154 managers from 27 Korean organizations. They concluded that the result of this study could only be applied to organizations in a highly collectivist culture and could not necessarily be applied to organizations with different cultures. All of these papers adopted one of Hofstede's dimensions, individualism vs. collectivism.

Quality Management Systems

Quality Management Systems includes papers that relate to quality. For instance, research conducted by Kettinger, Lee and Lee (1995) conducted a survey examining perceptions of ISF Service Quality in four different countries by using well-accepted measures of service quality. In this study, national culture dimensions were used to compare the four different countries, these being Korea, Hong Kong, Netherlands and U.S.A. Similarly to project management, this topic started to become significant in the period 1993 to 1995. However, after that, no papers are found until the last two periods, with one paper in each period. It has been found that all three papers adopted Hofstede's culture dimensions and used survey as their method of data collection. Also, two of these papers have used national culture in comparing at least two populations.

Risk management

There are three papers that fall under this category. A conceptual paper by Hurley (2006) suggests the impact of culture on risk tolerance. Earlier, Weber and Hsee (1998) conducted a survey which investigated the differences in risk preference in four different cultures, namely American, Polish, German and Chinese. Using students from major universities as a sample, the results indicated that cultural differences were significantly associated in the perception of the risk of the financial options rather than attitude towards perceived risk. In addition, Keil, Tan, Wei, Saarinen, Tuunainen and Wassenaar (2000) used laboratory experiment to investigate the risk propensity and risk perception of decision makers in three different cultures, Finland, the Netherlands and Singapore. There was an inverse relationship between the risk propensity of decision makers to risk perception and it was significantly stronger in Singapore than in Finland and the Netherlands. Both empirical studies used Hofstede's individualism dimension in their study. While one paper adopted the survey method, the other paper used a laboratory experiment for data collection. Except for an absence of papers in the period 2002 to 2004, there is one paper found in each period from 1996 to 2008. The trend shows that this issue might not be significant but is still important enough to be studied.

Leadership

Two conceptual papers falling under this category use House et al.'s national culture dimensions to explain the leadership style in different countries. The trend in Table 5 above shows that this topic started to become significant in 2002 where one paper was found in the period 2002 to 2004 and an increase to two papers in the last period.

Supply Chain Management

Two papers fall under this category, presenting the impact of culture on supply chain management, which includes logistics. Zhao, Barbara and Roth (2007) conducted a literature survey with the aim of investigating the impact of collectivism, power distance and long-term orientation on supply chain management in China. Table 5 above shows that this topic became important after 2005, with two papers are found in this period.

Technology Acceptance

The first paper falling under this category was published in 1994, this being a survey study conducted by Straub (1994) on the effect of culture on IT diffusion in Japan and the US. Using knowledge workers from four large Japanese and U.S. firms as his study sample, the result shows that culture does affect the predisposition towards

and selection of electronic communication media, namely email and fax, while the traditional media (face-to-face and telephone) were similar between cultures. It is not until 2006 that another published paper in this area, also involving national culture, is found. The authors, Srite and Karahanna (2006) identify national values as an important set of difference moderators in technology acceptance. The salient dimensions of national culture are uncertainty avoidance, individualism, power distance and masculinity. Their Partial Least Square analysis result revealed that in a feminine and high uncertainty avoidance culture, social norms are stronger determinants of intended behaviour, and masculinity/femininity values moderate the relationship between perceived ease of use and behavioural intention.

Other Issues

Other issues include the use of national culture in any system that could help the organization to increase the quality of decision making, namely Executive Information Systems, Global Support Systems, Group Support Systems, Decision Support Systems and Inter-Organizational Information Systems. For example, a survey conducted by Lai and Wong (2003) investigates the differences in adopting Global Information Systems in the United States and Japan. They used national culture to select the countries involved in their study. Earlier, in 2002, Tung and Quaddus conducted a study on the usage of Group Support System in two different culture countries identified by Hofstede which are Australia and Singapore. Using university students in both countries as a sample and analysing data using ANOVA tests, they explained the results by using Hofstede's salient dimensions of power distance, uncertainty avoidance, individualism and masculinity. It has also been found that 18 papers adopted Hofstede's model, while another three papers are a combination of either Hofstede's and Trompenaars' models or those of House et. al and Hall and Hall.

DISCUSSION AND CONCLUSION

The findings show that the number of studies which integrate IS research and national culture dimensions have become more numerous. As more companies take advantage of internationalization, the process and strategy planning that has been developed in one country might not be successful in other countries. Starting from the end of the 1990s and the early 2000s, the number of research papers published in the top 10 journals as defined by AIS increased significantly from 9 to 13 and after 2004 rose further to 16.

The survey was found to be the most popular method used to conduct the studies reviewed in this research. When investigating the impact of national culture on some other variables of interest, the direction of cause-effect relationships can often be viewed as unambiguous. National culture is formed over a long period of time, and is difficult to influence, so that it is similar to variables such as gender or age that are commonly viewed as a source of influence, but not as accepting influence from other variables. Therefore, at least as far as the aspect of national culture is concerned, the main drawback of research based on correlational cross-sectional studies – the uncertainty of the direction of influence – is largely avoided.

The results also show that Hofstede's cultural dimension model has been the model of national culture most often applied in IS research. We found that more than 50 percent of the papers reviewed used Hofstede's culture dimensions. This result is similar to that of Myers and Tan (2002) who found that 24 out of 36 cross-cultural studies in IS research used Hofstede's study. Only some of the papers that we reviewed give reasons why they choose Hofstede's model. First, Hofstede provide empirical culture indices that differentiate one country from another which makes it easier for the researchers to select their participative countries. For example a study by Straub (1994) selected Japan and the U.S. as the participative countries because Hofstede ranked Japan as 44th among 50 countries in uncertainty avoidance and ranked the U.S. as 11th out of 50 countries. Stock et. Al. (1996) used Hofstede's model because Hofstede found that the U.S., Japan and European countries differed in a number of cultural dimensions. Second, Hofstede's dimensions are suitable not only at an individual level but also at an organizational level. Png et. al (2001) used uncertainty avoidance and power distance because these two dimensions are the most relevant dimensions of national culture in investigating the impact of corporate decisions on IT infrastructure. Kankanhalli et. al (2004) used individualism vs. collectivism and masculinity vs. femininity as a basis to build their theoretical model since these dimensions are more relevant for research on individual behaviour and practices. Third, Hofstede's dimensions of national culture has been widely accepted in IS research as stated in Preston et. al (2006). Sarker et. al (2005) also stated that since the individualism vs. collectivism from Hofstede's has been adopted in various studies such as information systems, distance learning, human communication and management, they believed that this dimension is suitable in explaining the differences in knowledge transfer between cultures.

Another reason why IS researchers adopted Hofstede's model might be due to its suitability for IS research. In this study, we found that the Hofstede model was used not only to compare results in two or more participative countries, but to explain a result in a single country (as in Zhao, et. al, 2007). In addition, his dimensions were used as moderators between the variables (as in Keil et. al, 2000) or for testing the research framework (as in

Sarker et. al, 2005). Even though most of the papers reviewed adopted Hofstede's model, there are other papers which adopted alternative models, namely those of Hall and Hall, Trompenaars, Schwartz and House et.al, or which used a combination of models. This shows that alternative models may only be appropriate for certain types of IS research such as Hall and Hall's model which suits the communication category, and House et. al's model which lends itself to research into leadership. Hofstede's model appears suited to all areas.

We also found that there are various areas in IS research in which the national culture models and dimensions have increasingly been used. Many of the papers we reviewed used national culture dimensions and models in their studies of communication. The popularity of framing studies within the national culture context in the areas of knowledge management, leadership, supply chain management and technology acceptance increased after 2002. Analysis of the categories relating to the application of national culture shows the significance of this concept in IS studies in this globalization era.

The contribution of this study can be seen from both theoretical and practical points of view. Theoretically, the result could contribute to the body of knowledge on the trends of information systems research papers with regard to involving national culture. The increments reported in this paper show that this topic has become more significant in today's world. It also supports the result reported by Myers and Tan (2002) that most of the IS papers published from 1990 to 2008 involving cross-cultural study used Hofstede's dimensions of culture. In practical terms, the result could enhance management decision making quality by highlighting the significance of culture for each system in organizations such as communication, knowledge management, project management, risk management and others. Whilst this study only reviewed papers that were published in the selected top ten journals, to strengthen the result, future research should review cross-cultural study-related articles from all IS journals and conferences.

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